

THE INVENTION CLAIMED IS:

1           1. A method of allocating memory requests in a  
2 physical memory space defined between a first boundary and a  
3 second boundary, the method comprising the steps of:

4                   allocating non-pinned memory requests from  
5 the first boundary; and

6                   allocating pinned memory requests from the  
7 second boundary.

1           2. The method of claim 1, wherein a non-pinned  
2 region is provided from the first boundary toward the second  
3 boundary, a pinned region is provided from the second  
4 boundary toward the first boundary and a free region is  
5 defined between the non-pinned region and the pinned region,  
6 and further comprising:

7                   receiving a pinned memory request;

8                   determining whether a hole that accommodates  
9 the received pinned memory request exists in the pinned  
10 region;

11                   if such a hole exists, allocating the  
12 received pinned memory request to the hole; and

13                   if such a hole does not exist, allocating the  
14 received pinned memory request in the free region adjacent  
15 the pinned region.

1           3. The method of claim 2, wherein if more than  
2 one such hole exists, the received pinned memory request is  
3 allocated to a smallest one of such holes.

1           4. The method of claim 2, further comprising  
2 operating a background process to compact the non-pinned

3 region by moving at least one non-pinned memory block from  
4 an end of the non-pinned region adjacent the free region to  
5 fill at least one hole in the non-pinned region.

1               5. A method of allocating a memory request in a  
2 physical memory space defined between a first boundary and a  
3 second boundary, a non-pinned region being provided from the  
4 first boundary toward the second boundary and a pinned  
5 region being provided from the second boundary toward the  
6 first boundary and a free region being defined between the  
7 non-pinned region and the pinned region, the method  
8 comprising the steps of:

9               receiving a pinned memory request;  
10               determining that there is no hole in the  
11 pinned region that accommodates the received pinned memory  
12 request;  
13               determining that the free region is not large  
14 enough to accommodate the pinned memory request;  
15               widening the free region by moving a non-  
16 pinned memory block from an end of the non-pinned region  
17 adjacent the free region to a hole in the pinned region; and  
18               allocating the received pinned memory request  
19 to the widened free region.

1               6. A method of allocating a memory request in a  
2 physical memory space defined between a first boundary and a  
3 second boundary, a non-pinned region being provided from the  
4 first boundary toward the second boundary and a pinned  
5 region being provided from the second boundary toward the  
6 first boundary and a free region being defined between the

7 non-pinned region and the pinned region, the method  
8 comprising the steps of:  
9 receiving a pinned memory request;  
10 determining that there is a non-pinned memory  
11 block located in the pinned region that occupies a hole at  
12 least as large as the received pinned memory request;  
13 moving said non-pinned memory block located  
14 in the pinned region to free said hole that is at least as  
15 large as the received pinned memory request; and  
16 allocating the received pinned memory request  
17 to said freed hole that is at least as large as the received  
18 pinned memory request.

1                   7. The method of claim 6, wherein the non-pinned  
2 memory block is moved to the free region adjacent the non-  
3 pinned region.

1                   8. A digital memory apparatus, comprising:  
2                    a memory component providing a physical  
3 memory space, the physical memory space defined between a  
4 first boundary and a second boundary; and  
5                    control means for controlling allocation of  
6 the physical memory space, the control means being  
7 programmed to:  
8                    allocate non-pinned memory requests from the  
9 first boundary; and  
10                  allocate pinned memory requests from the  
11 second boundary.

1                           9. The apparatus of claim 8, wherein a non-  
2 pinned region is provided from the first boundary toward the

3 second boundary, a pinned region is provided from the second  
4 boundary toward the first boundary and a free region is  
5 defined between the non-pinned region and the pinned region,  
6 and the control means is further programmed to:

7 receive a pinned memory request;

8 determine whether a hole that accommodates  
9 the received pinned memory request exists in the pinned  
10 region;

11 if such a hole exists, allocate the received  
12 pinned memory request to the hole; and

13 if such a hole does not exist, allocate the  
14 received pinned memory request in the free region adjacent  
15 the pinned region.

1 10. The apparatus of claim 9, wherein if more  
2 than one such hole exists, the control means is programmed  
3 to allocate the received pinned memory request to a smallest  
4 one of such holes.

1 11. The apparatus of claim 9, wherein the control  
2 means is further programmed to operate a background process  
3 to compact the non-pinned region by moving at least one non-  
4 pinned memory block from an end of the non-pinned region  
5 adjacent the free region to fill at least one hole in the  
6 non-pinned region.

1 12. A digital memory apparatus, comprising:

2 a memory component providing a physical  
3 memory space, the physical memory space defined between a  
4 first boundary and a second boundary, a non-pinned region  
5 being provided from the first boundary toward the second

6 boundary and a pinned region being provided from the second  
7 boundary toward the first boundary and a free region being  
8 defined between the non-pinned region and the pinned region;  
9 and

10 control means for controlling allocation of  
11 the physical memory space, the control means being  
12 programmed to:

13 receive a pinned memory request;  
14 determine that there is no hole in the  
15 pinned region that accommodates the received pinned memory  
16 request;  
17 determine that the free region is not  
18 large enough to accommodate the pinned memory request;  
19 widen the free region by moving a non-  
20 pinned memory block from an end of the non-pinned region  
21 adjacent the free region to a hole in the pinned region; and  
22 allocate the received pinned memory  
23 request to the widened free region.

1 13. A digital memory apparatus, comprising:  
2 a memory component providing a physical  
3 memory space, the physical memory space defined between a  
4 first boundary and a second boundary, a non-pinned region  
5 being provided from the first boundary toward the second  
6 boundary and a pinned region being provided from the second  
7 boundary toward the first boundary and a free region being  
8 defined between the non-pinned region and the pinned region;  
9 and

10 control means for controlling allocation of  
11 the physical memory space, the control means being  
12 programmed to:

13                   receive a pinned memory request;  
14                   determine that there is a non-pinned  
15 memory block located in the pinned region that occupies a  
16 hole at least as large as the received pinned memory  
17 request;  
18                   move said non-pinned memory block  
19 located in the pinned region to free said hole that is at  
20 least as large as the received pinned memory request; and  
21                   allocate the received pinned memory  
22 request to said freed hole that is at least as large as the  
23 received pinned memory request.

1                   14. The apparatus of claim 13, wherein the  
2 control means is programmed to move the non-pinned memory  
3 block to the free region adjacent the non-pinned region.

1                   15. A computer program product comprising:  
2                   a medium readable by a computer, the computer  
3 readable medium having computer program code adapted to:  
4                   allocate non-pinned memory requests from  
5 a first boundary of a physical memory space defined between  
6 the first boundary and a second boundary; and  
7                   allocate pinned memory requests from the  
8 second boundary of the physical memory space.

1                   16. A method of handling memory allocation  
2 requests in a physical memory space, a non-pinned region  
3 being defined at a first end of the physical memory space  
4 and a pinned region being defined at a second end of the  
5 physical space, the second end being opposite to the first

6 end, a free region being defined between the non-pinned  
7 region and the pinned region, the method comprising:

8 (i) responding to a non-pinned memory  
9 allocation request by allocating free space from the non-  
10 pinned region first, from the free region second and from  
11 the pinned region last; and

12 (ii) responding to a pinned memory request  
13 only by one of: (a) allocating space from a hole in the  
14 pinned region or (b) allocating free space from the free  
15 region.

1 17. The method of claim 16, wherein step (i)  
2 includes allocating free space from the free region  
3 beginning from the non-pinned region toward the pinned  
4 region, and step (ii) includes allocating free space from  
5 the free region beginning from the pinned region toward the  
6 non-pinned region.

1 18. The method of claim 16, wherein step (ii)  
2 includes moving at least one non-pinned page from the hole  
3 in the pinned region.

1 19. The method of claim 16, wherein step (ii)  
2 includes widening the free region.

1 20. The method of claim 19, where the widening of  
2 the free region includes moving at least one non-pinned page  
from an end of the non-pinned region.